EXHIBIT 1

IN THE UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF OKLAHOMA

W. A. DREW EDMONDSON, in his capacity as ATTORNEY GENERAL OF THE STATE OF OKLAHOMA and OKLAHOMA SECRETARY OF THE ENVIRONMENT C. MILES TOLBERT, in his capacity as the TRUSTEE FOR NATURAL RESOURCES FOR THE STATE OF OKLAHOMA,	)
Plaintiff,	)
vs.	) 4:05-CV-00329-TCK-SAJ
TYSON FOODS, INC., et al,	)
Defendants.	)

- -

VOLUME I OF THE VIDEOTAPED DEPOSITION OF INDRAJEET CHAUBEY, PhD, produced as a witness on behalf of the Plaintiff in the above styled and numbered cause, taken on the 27th day of January, 2009, in the City of Tulsa, County of Tulsa, State of Oklahoma, before me, Lisa A. Steinmeyer, a Certified Shorthand Reporter, duly certified under and by virtue of the laws of the State of Oklahoma.

I N D E X

wait for you to finish your answer before asking another one so that the court reporter can get that down. With others being on the phone today and making objections, it will be a little more distracting I think so if they do make an objection, wait until it's completed and then we'll go forward with your responses. All right? 08:54AM

A Okay.

Q We will take periodic breaks. At any time you feel like you want to take a break and we haven't taken one, let me know and we'll do that. All right? 08:54AM

A Okay.

Q Tell the court where you reside.

A I live in West Lafayette, Indiana. 08:55AM

Q And you're employed there; correct?

A I am employed at Purdue University.

Q Since you agreed to appear and testify, have you been contacted by any of the poultry integrator defendant lawyers in this case? 08:55AM

A Yes. I got subpoena and a phone call from Robert George and Michael --

Q Bond?

A Bond, yes.

Q All right. When did that call occur; do you 08:55AM

remember?

A It occurred last week.

Q All right, and they called you?

A Yes.

Q And what did they say when they called you? 08:55AM

A I guess the conversation was they wanted to know if I was a paid expert on this case and if I was going to take any side and wanted to know what it was going to be about.

Q And did you respond to their question whether 08:55AM you were a paid expert?

A Yes, I did respond to that question.

Q What was your response?

A I am not a paid expert.

Q All right. Did they ask you any other 08:56AM questions or make any other statements to you in that conversation?

A I recall I think one of the questions was if I understood some of the comments I make could potentially determine the liability in this case. 08:56AM

Q Did those statements to you make you feel uncomfortable in any way?

A No, it did not.

Q Okay. Now, you and I have spoken before today; is that correct? 08:56AM

A Yes.
Q One time at your office and one time in my office yesterday; is that true?
A Yes.
Q All right. In those discussions, were you asked to say anything you could not believe was true? 08:56AM

MS. LONGWELL: Object.

A No.
Q Has anyone for the State of Oklahoma or its attorneys requested that you render an opinion in connection with the facts in this case? 08:57AM
A No.
Q Have you seen the complaint filed by the State of Oklahoma against the poultry integrator defendants in this case? 08:57AM
A No.
Q Do you know, in fact, who all the defendants are in this case?
A No, I do not. 08:57AM
Q You heard lawyers this morning announce for various companies, did you not?
A Yes.
Q Other than that, have you heard the names of the defendants in this case? 08:57AM

A No. This is the first time I heard some of those names.

Q Do you know a gentleman by the name of Bernard Engel?

A I know him. 08:57AM

Q How long have you known him?

A We have worked together for a little over two years now, and I've known him for more than seven or eight years.

Q All right, and where did you first meet him; 08:57AM do you recall?

A We first met in a conference, our professional American Society of Agricultural and Biological Engineering Conference.

Q All right. Have you looked at or read Dr. 08:58AM Engel's expert report that he prepared for this case?

A I have not.

Q Have you looked at any parts of it?

A No. 08:58AM

Q Have you discussed with Dr. Engel the nature and scope of his opinions contained in that report that he has prepared for this case?

A No, I have not.

Q Have you seen or read any of the expert 08:58AM

reports submitted by the defendants in this case?
A No.
Q Have you looked at any or read any reports submitted by other experts submitted by the State of Oklahoma in this case? 08:58AM
A No.
Q Do you know the names of the experts used by the State of Oklahoma in this case?
A I do not.
Q Do you know the names of the experts used by 08:58AM
the defendants in this case?
A I do not.
Q Have you been asked at any time to perform work for any expert who's identified himself to be an expert in this case? 08:59AM
A Can you ask that question again?
Q Have you been requested by any person identifying themself to be an expert in this case to do work for them?
A No. 08:59AM
Q Have you looked at or read any transcripts of either Dr. Engel or others in this case?
A No.
Q Have you been provided any data that was gathered by the State or people working on behalf of 08:59AM

the State of Oklahoma in this case?

A No.

Q Have you been provided any data provided through the defendants in this case?

A No. 08:59AM

Q What, if any, encouragement or discouragement has Dr. Engel provided to you for your testimony today, if any?

A None.

Q Has Dr. Engel put any pressure on you to testify? 08:59AM

A No, he has not. I don't see how he can put pressure. I'm a tenured professor at Purdue. So no one can.

Q Have you been promised anything for your testimony in this case? 09:00AM

A No.

Q Have your expenses been paid to come to Tulsa?

A Yes.

Q And what expenses were those? 09:00AM

A Airfare and hotel.

Q All right. Have you, sir, in your professional career at any time been requested directly by any of the defendants in this case to perform consulting work on their behalf? 09:00AM

A No.
Q Have you performed any consulting work for the State of Oklahoma in the past?
A No.
Q Have you been retained to provide an opinion about the State of Oklahoma experts' opinions? 09:00AM
A No.
Q Have you been retained to consult with any of the State's experts on any issue in this case?
A No. 09:01AM
Q Have you been retained by anyone to provide opinions as to the defendants' experts' opinions?
A No.
Q Other than coming to testify today in Tulsa, have you been asked by me or others for the State of Oklahoma to do any work on this case? 09:01AM
A No.
Q Other than your coming today to testify, have you been asked by me or others for the State of Oklahoma to form any opinions specifically in connection with this case? 09:01AM
A No.
Q Let's talk a little bit about you, Dr. Chaubey. I'm going to hand you what is Exhibit No. 1. I'll represent to you that this is a document 09:02AM

A It was from University of Allahabad in India.
Q Now, you've obtained a masters degree also. It's in biological and agricultural engineering. Where did you obtain that?
A At University of Arkansas. 09:03AM
Q And what year was that?
A 1994.
Q All right. Did you have a supervisor in your masters thesis work at that university?
A Yes. 09:03AM
Q Who was that?
A Dr. Dwayne Edwards.
Q Is he also known as D. R. Edwards?
A Yes.
Q All right. What was the thesis that you -- 09:04AM general subject matter of the thesis that you provided for your masters?
A I investigated how filter strips or buffer strips can be used as a best management practice to filter some of the water quality constituents from 09:04AM land-applied poultry litter and swine manure.
Q All right. You then obtained a PhD. Where was that obtained?
A Oklahoma State University.
Q And what was the degree obtained there? 09:04AM

A Biosystems engineering.
Q And what year was that degree obtained?
A 1997.
Q Did you have a thesis captain or director in your work there? 09:04AM
A Yes.
Q Who was that?
A It was Dr. C. T. Hahn.
Q What was the general subject of the thesis that you prepared for your doctorate? 09:05AM
A It was in the area of hydrology and watershed modeling. I investigated how different uncertainties relate to model inputs and parameters.
Q Okay. Let's talk a little bit about the awards and honors you have listed here. There are 09:05AM several, but are these all of the ones that you have obtained?
A No. Actually, what I consider the most significant is not listed here.
Q What is the award or honor that is significant 09:05AM to you that's not listed?
A It is New Holland Young Researcher Award. It is given by American Society of Agricultural and Biological Engineering to one researcher every year younger than 40 years old. 09:05AM

located in Arkansas; some are located in Indiana.
Q Are the ones in Arkansas connected to the or related to the Illinois River watershed?
A Yes.
Q Are you familiar with that watershed? 09:10AM
A I am.
Q Do you know the boundaries of it generally speaking?
A You mean boundaries of the Illinois River watershed? 09:10AM
Q Of the Illinois River watershed.
A I understand the boundaries of the Illinois River watershed.
Q Okay. Are there subwatersheds that you have also been working with within the Illinois River 09:10AM watershed?
A Yes.
Q What would that be?
A That will be Moores Creek, Lincoln Lake watershed, which is a small subwatershed within IRDA 09:11AM or Illinois River drainage area.
Q Okay. So I think I understand what you are saying. Is the area you are speaking to only in Arkansas and not Arkansas and Oklahoma?
A Yes. 09:11AM

Q All right. So the subwatershed, does it have a name?

A Moores Creek watershed. It is also at times referred as Lincoln Lake watershed.

Q All right. Has it ever been referred to as Muddy Fork; do you know? 09:11AM

A It is part of the Muddy Fork watershed, yes.

Q Okay. Let's talk a little bit about your employment history, if we can, sir. Starting with when you were still studying -- or tell me when was the first time that you took a paid position in or around your bachelors degree or after it, sometime in that starting time frame. 09:11AM

A So in 1992 in January I started my masters degree at the University of Arkansas, and I was a half-time research assistant, working 20 hours a week on a research project. 09:12AM

Q What was the nature of the project that you were working on there?

A I was involved in looking at land application of poultry litter and swine manure and how that results in water quality, constituent transport in small controlled plots, and what different best management practices could be considered to minimize that impact. 09:12AM

Q With regard to that work, did it include bacteria transport as part of those constituents?
A Yes, it did.
Q All right, and that period of time was from -- what were the dates of that work? 09:13AM
A So it went from January 1992 to July 1994.
Q Okay. Did you then obtain employment after that work in July of '94?
A I started my PhD in August of 1994 at Oklahoma State University, and I was a half-time research 09:13AM assistant there, working 20 hours a week.
Q What kind of work were you performing as a half-time research assistant?
A I was involved in looking at hydrologic and water quality models, how do they work in different 09:13AM watersheds, how we can improve them, how we can reduce their uncertainty.
Q Did you meet a gentleman by the name of Dr. Storm while at OSU?
A Dr. Daniel Storm, yes. 09:13AM
Q And did he participate in your PhD studies in any way?
A He was a member of my PhD committee.
Q After October '97, did you have additional employment? 09:14AM

A Yes.
Q Tell us what that was.
A I was assistant research scientist at University of Alabama from October 1997 until April 2000. 09:14AM
Q And what kind of work did you do as an assistant research scientist there?
A I worked as a hydrologist and water quality modeler, again, in general, looking at water response to runoff, sediment, nutrients. 09:14AM
Q Was that a full-time employment?
A That was a full-time employment.
Q After April 2000, did you secure employment elsewhere?
A I became assistant professor at University of Arkansas. 09:15AM
Q And what was the time frame that you were at University of Arkansas?
A So from May 2000 until December 2006 I was there. 09:15AM
Q All right, and did your position as an assistant professor change at any time during that period?
A In 2005 I became -- I got tenured and I was promoted to associate professor. 09:15AM

Q All right. Where did you go after leaving University of Arkansas in December of '06?

A So in January of 2007 I became associate professor at Purdue University.

Q And were you hired there as a tenured professor? 09:15AM

A No, I was not hired there as a tenured professor. I got tenure last year.

Q You mentioned that you had done some work in the watershed of Indiana and then you've talked about the Illinois River watershed. Are there any other watersheds that you've had experience with besides those two? I say two. Let me back up. How many Indiana watersheds have you been involved with in doing your work or study? 09:16AM

A At least half a dozen of Indiana watersheds I'm working on right now.

Q Other than the Illinois River watershed, are there others in Arkansas that you've done work in?

A I've worked in Beaver Lake watershed. I was involved in Eucha-Spavinaw watershed and a number of what I call priority watersheds in Arkansas. 09:16AM

Q What kind of watersheds?

A Priority watersheds.

Q Priority watersheds, okay. Just briefly tell 09:17AM

the court, if you would, what kind of areas of study or investigation you were conducting in these various watersheds; are they consistent with what you've done in your degrees?

A Yes. They are all related to agricultural watersheds and looking at different processes related to hydrology and water quality, how do these processes affect what gets transported from these watersheds, how we can mathematically model them and what kind of different management practices we can evaluate to see what happens. 09:17AM 09:17AM

Q All right. How long now have you then -- I want to speak now basically about the Illinois River watershed or its subbasins. How long have you been directly involved in studying or investigating that watershed or its subbasins? 09:18AM

A My masters thesis was based on work in the Illinois River watershed, and then when I came back as a faculty in 2000, since then I have been involved in a number of projects in the watershed. 09:18AM

Q All right. So some of that work was in the early '90's and then again starting in around 2000?

A Yes.

Q All right. Did your work in the watershed include what I called field work study? 09:18AM

MS. LONGWELL: Object, form.

A Yes.

Q Tell the court what field work study would be.

A Field work study would involve instrumenting, collecting data at the field scale and our developing mathematical models to investigate what happens in terms of hydrology and water quality at a scale typical of a field. 09:18AM

Q Do you have experience in actually taking samples then while in the field? 09:19AM

A I have done a lot of field experimentation and have been involved directly in collecting field data.

Q Has your experience involved setting up instrumentation which would remotely or automatically collect data also? 09:19AM

A Yes.

Q In your work in the Illinois River watershed, have you relied solely on just the data that you've collected or others under your supervision? 09:20AM

A Ask that question again.

Q In your work in the Illinois River watershed, is that work, and certainly the papers you've written, relying solely on the data that you collect or would it include data from others? 09:20AM

A No. It does involve data and publications from others who have worked in the watershed.

Q So you have read published literature that would have some impact on your study or investigation; is that correct? 09:20AM

A Yes.

Q Based on your experience, how would you characterize the volume of published literature and data that involves the Illinois River watershed?

A It is, in my opinion, a very well studied watershed. Compared to lots of other watersheds that I have experienced or seen, it is a data-rich watershed. 09:20AM

Q Do you know whether or not research and study is still ongoing with regard to the Illinois River watershed? By others first, let's ask that. Do you know if others are still doing studies in the Illinois River? 09:21AM

A I don't know for sure. There was some studies going on when I left and was different assignment to Purdue, so I assume they are still continuing. 09:21AM

Q Are you continuing to do any work in the Illinois River watershed?

A Yes.

Q And that area of work involves what? 09:21AM

A I am funded by USDA to study in Lincoln Lake watershed different best management practices, how do they work, and some of the socio-economic factors associated with BMP adoption, implementation and maintenance. 09:22AM

Q Do you have any estimate of how long that work is going to continue?

A We are in fourth year of that project, so that will end in September of '09.

Q All right. Tell me, what are some of the sources of data that you have reviewed either through literature or downloaded that became part of your study or your work or your experience? 09:22AM

MS. LONGWELL: Object to form.

A Besides my own data, I have worked with the data that have been collected by Arkansas Water Resources Center, Arkansas Natural Resources Commission and Arkansas Department of Environmental Quality. I have worked with some GIS data that have been compiled and are housed by Center For Advanced and Special Technology, which is part of University of Arkansas. So they come from a variety of sources. 09:22AM 09:23AM

Q Is USGS also a source?

A Yes, of course, USGS is also a source of that 09:23AM

A About 35 percent is forest. So that's about 90 percent, and rest are in other categories.

Q All right. Do you know what the approximate percentage of the urban area is in the Illinois River watershed? 09:28AM

A So it has to be less than 10 I would think. More like 6 or 7 percent; no more than that.

Q Based on your knowledge and skill and education, training and experience, including reading published literature, do you have an opinion 09:28AM what is the primary method used for poultry waste disposal?

MS. LONGWELL: Object to form.

A Yes.

Q What is that opinion? 09:28AM

A Land application, surface application of poultry litter.

Q All right. From your review of published literature, do you have any knowledge of approximately how long land application of poultry 09:29AM waste has occurred in the IRW?

MS. LONGWELL: Object to form.

A Can you ask that question again?

Q I will. From your review of literature or other sources, do you have knowledge of 09:29AM

approximately how long poultry waste has been generally land applied in the IRW?

MS. LONGWELL: I'm just going to state a continuing objection to the term waste. I think that's traditional, but that way I'm not going to continue to object just because you use that word. 09:29AM

MR. GARREN: All right.

A Yes.

Q Approximately how long have you learned that would be? 09:29AM

A For a long time. I mean, since poultry industry has been concentrated in northwest Arkansas.

Q All right. When I use the term waste, let me maybe define that so that you and I have an understanding, too. I define waste as the excrement, the bedding material and things such as feathers or wasted feed and moisture that occurs that's taken out of the house at the conclusion of the growing session, sometimes commonly referred to as poultry litter in Arkansas. Do you know the term poultry litter? 09:29AM 09:30AM

A Yes.

Q And can you tell me what you understand the term poultry litter would mean? 09:30AM

says that Moores Creek has been studied -- looking at Page 1, the second paragraph, and I'll quote, Moores Creek watershed has been monitored continuously from 1991 to 2004, except for a period from October '97 to December '98. Did you rely on any of the monitoring data that was collected during that period for this report? 09:38AM

A Yes.

Q Tell the court, if you would, please, what were the general subject and objectives of the research that you performed as reported in Exhibit 3. 09:38AM

A We wanted to continue to collect water quality data from Moores Creek and Lincoln Lake, and then we wanted to assess best management practices that were implemented in the watershed and how they were effective in improving water quality, and another goal was to prepare a watershed management plan and, you know, combine that with outreach training and numerous activities, and then compile that out into a project report that was submitted to the funding agency. 09:38AM 09:39AM

Q In the executive summary of this report at the -- I believe the third sentence it said sources of NPS, that would be non-point source pollution, in 09:39AM

the watershed which are grazing, they are primarily recycling the nutrients within the watershed.

Q Okay. I'm going to change subjects on you a little bit now. When you were at the Arkansas Water Resource Center -- 09:56AM

A Can we take a real quick break?

Q We can take a break.

MR. GARREN: We're going off the Record for just a second and we'll be back shortly.

(Following a short recess at 9:56 p.m., proceedings continued on the Record at 10:02 a.m.) 09:56AM

Q Dr. Chaubey, when you were in the Arkansas Water Resource Center working with them, did you have an opportunity to do any work called or referred to as mass balance? 10:02AM

A Yes.

Q Tell the court, basically what does mass balance mean?

A Mass balance involves -- basically it's similar to balancing your checkbook, what comes in and what goes out, and the difference is how much gets accumulated. So we were doing that in the context of nutrients, how much nutrients are getting in the watershed, how much are getting out and then what gets accumulated. 10:03AM

Q When you say we, who are you referring to?
A Myself and my graduate student, and I had done this work with Dr. Marc Nelson.
Q What is the name of the graduate student that did your work? 10:03AM
A Kati White.
Q Let's look at another exhibit here. I'll hand you Exhibit 15. Have you seen that document before?
A Yes.
Q The document is entitled Illinois River 10:04AM Phosphorus Mass Balance Computation Draft, and it has the name of Dr. Nelson, Kati White and your name on the front page. Just for the Record, I'll let it note that this has a Bates number of an ADEQ 2007 915. Can you tell the court, if you would, please, 10:04AM what is this document?
A It was a draft report from the mass balance study that we had done for phosphorus in the Illinois River watershed.
Q What was the time period this mass balance 10:05AM work was being performed?
A I believe we were looking from 1997 to 2001, around that period.
Q The data that's reported in this Exhibit 15, do you know whether or not -- or what was the source 10:05AM

of the data?

A We looked at a number of sources for the data. Water quality data came from Arkansas Water Resources Center and Dr. Marc Nelson, and then we looked at USDA agricultural statistics reports. We looked at fertilizer sale data in the two counties where this watershed is located in Arkansas. So there were a number of different sources. Some of the point source data came directly from the municipalities that have got the best water treatment plants in the watershed. 10:05AM 10:06AM

Q If we look over at the third page of this document, which is Bates number 0917, the title of this spreadsheet says Illinois River Phosphorus Mass Balance Inputs. Does this to your knowledge list the inputs that were identified and considered in your work? 10:06AM

A Yes.

Q Tell the court, what generally are those inputs? 10:06AM

A So they are in two different categories, point sources and non-point sources. Point sources are effluent discharge from four wastewater treatment plants that are located in the watershed, and the non-point sources are sludge application, manure 10:07AM

from different animals, including swines, hogs, broilers, layers, turkeys, cattle beef, dairy, and also inorganic fertilizer.

Q The numbers that are shown in columns across from the categories that you just described, what do they represent? 10:07AM

A They represent the amount of phosphorus from these different sources in different years from 1997 to 2001, and then various numbers for all these five years. 10:07AM

Q And did the -- do I see in the last column of this document percentages; is that what is represented there?

A Yes.

Q What are those percentages representing in the context of this document or this page? 10:08AM

A In the mass balance, when you look at the input, what its category represents as a percentage of the total input.

Q And so each category then is summed to a percentage; is that what you're saying? 10:08AM

A Yes.

Q And in the column just to the left of that, what does that column represent, the percentages that we see there? 10:08AM

A Broilers.
Q All right. Look at Page 8, if you would, please, Dr. Chaubey. The first sentence in the third paragraph, it says a key concept for understanding this interpretation of the phosphorus mass balance is that once phosphorus is in the stream, it is not being removed from the stream, except downstream. Can you tell me what that means? 10:29AM
MS. LONGWELL: Object to form.
MR. GEORGE: Object to form, calls for speculation. 10:29AM
A What it means is that once phosphorus is delivered to the stream, it will eventually be transported downstream, and it is not removed by any other mechanism. 10:30AM
Q All right. So from that, if the stream leads to Lake Tenkiller, will the phosphorus ultimately end up in Lake Tenkiller?
MS. LONGWELL: Object to form.
MR. GEORGE: Object to the form. 10:30AM
MS. LONGWELL: Calls for speculation.
A It will be transported down the stream and eventually can be expected to reach there.
Q The reservoir?
A Yes. 10:30AM

A So if the total numbers that you measure at Highway 59 bridge does not change, if that stayed the same, then percentage of point source contribution would decrease and percentage of non-point source contribution would increase, but if the numbers go down similarly, then you may have to look at that data. 10:41AM

Q Okay. In your professional experience and review of published literature, are you aware of any published paper that contradicts the findings and conclusions shown in Exhibit 8? 10:41AM

MS. LONGWELL: Object to form.

A No.

Q Based on the numbers on Table 2, Page 6 that you talked about earlier, the 1.8 million kilograms in 1997 versus the total input of 3.1 million kilograms, and based upon your knowledge, skill and education and training, including review of published literature, do you have an opinion whether poultry production practices of land applying waste is a substantial contributor of the phosphorus to the overall phosphorus loads within the watershed? 10:42AM 10:43AM

MS. LONGWELL: Object to form.

MR. GEORGE: Object to form, vague, calls for an expert opinion that's not been found by this 10:43AM

witness.

A Yes.

Q And what would be that opinion?

MR. GEORGE: Same objection.

A Based on inputs, poultry litter is the dominant source of phosphorus in the watershed. 10:43AM

Q All right. Is there anything else in your knowledge, experience that you rely on in making that opinion besides this Table 2?

MS. LONGWELL: Object to form. 10:43AM

A Other litter from this watershed and other watersheds and published journals and reports from others.

Q All right. Let's talk a little bit about some terminology. Are you familiar with the term surface runoff and -- well, let me just ask that. Are you familiar with that term? 10:44AM

A Yes.

Q In a hydrologic concept, can you tell the court what that means? 10:44AM

A What it means is when it rains, part of the precipitation travels through the soil surface or land surface, and that is primarily the surface runoff. It can also represent some of the water that travels partially through the subsurface but 10:44AM

IN THE UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF OKLAHOMA

W. A. DREW EDMONDSON, in his capacity as ATTORNEY GENERAL OF THE STATE OF OKLAHOMA and OKLAHOMA SECRETARY OF THE ENVIRONMENT C. MILES TOLBERT, in his capacity as the TRUSTEE FOR NATURAL RESOURCES FOR THE STATE OF OKLAHOMA,	)
Plaintiff,	)
vs.	) 4:05-CV-00329-TCK-SAJ
TYSON FOODS, INC., et al,	)
Defendants.	)

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VOLUME II OF THE VIDEOTAPED DEPOSITION OF INDRAJEET CHAUBEY, PhD, produced as a witness on behalf of the Plaintiff in the above styled and numbered cause, taken on the 2nd day of March, 2009, in the City of Tulsa, County of Tulsa, State of Oklahoma, before me, Lisa A. Steinmeyer, a Certified Shorthand Reporter, duly certified under and by virtue of the laws of the State of Oklahoma.

I N D E X

A I have reviewed some of the papers that go back to at least the '80s I would think. I have reviewed quite a few papers when I wrote this report on assessment of effectiveness of buffer zones in removing impurities, and since then I continue to review papers that get submitted to journals for my opinion, and it has been, I would think, you know, hundreds. 08:37AM

Q All right. This may seem so obvious that it's a funny question, but I've not heard anything or read anything that said there's a reason for buffer strips other than to protect water quality. Do you agree with that statement? 08:38AM

A Yes.

Q Let's -- woops. I've got to get it here. Let me hand you Exhibit No. 7, Dr. Chaubey. Do you recognize this as a study in a paper published by you involving delineating runoff processes and critical runoff areas in a pasture hillslope of the Ozark Highlands? 08:38AM 08:39AM

A I recognize this paper, yes.

Q Okay, and did you, in fact, co-author it?

A Yes. I was project director on this project that was funded by USDA.

Q All right. This article was published in 08:39AM

2008. Can you tell us generally what was the time frame of the study that was conducted?

A I believe we collected data over a two-year period. I think it was 2004-2005 or 2005-2006.

Q So we're looking at a two-year period time frame? 08:39AM

A We are looking at a two-year period time frame. We collected rainfall runoff data for every single event that took place within that two-year time frame. 08:39AM

Q All right, and these are natural rainfall events?

A These are all natural rainfall events.

Q Was there any simulated rainfall events?

A No. 08:40AM

Q All right, and the area that this study was conducted, tell the court where that is.

A The study was conducted in the Savoy Experimental Watershed. Savoy Experimental Watershed or SEW, as we refer in this paper is subwatershed within the Illinois River watershed. 08:40AM

Q All right. It's not far from Fayetteville; is that correct?

A It is not far from Fayetteville, yes.

Q All right. Look at the introduction in the 08:40AM

left-hand column of this first page, and it says at the bottom of that column, and I'll read it for the Record, for example, storm runoff plays a major role in phosphorus transport and diffuse P or phosphorus pollution and is a major contributor to freshwater systems. The role of P in accelerating eutrophication in freshwater systems was recognized over three decades ago, and you cite Schindler and others in 1971. As a result, P transport has become a focus of water quality research. That research with regard to water quality relating to phosphorus, as I understand it then, has been going on since the early '70s; is that what this tells us? 08:40AM 08:41AM

MR. BOND: Object to the form.

A Yes. 08:41AM

Q In your work in this study and others, have you researched that other type of published literature regarding the effects of phosphorus in accelerating eutrophication in freshwater systems?

MR. BOND: Object to the form. 08:41AM

A In this and other studies we have done literature review to see what others studied and found.

Q Okay. Let's look at the abstract. I want to ask you what the objective of the study was, and 08:42AM

Q A considerable amount of it is unshaded areas; would you agree?

MR. BOND: Object to form.

MS. TUCKER: Object to form.

MS. LONGWELL: Object to form. 09:34AM

A Yes.

Q Based on the studies we've talked about and the published literature, your experience and education, do you have an opinion whether there is sufficient evidence to establish that phosphorus is 09:35AM transported, phosphorus and nitrogen is transported from waste-applied fields in runoff to the waters of the Illinois River watershed?

MS. TUCKER: Object to form.

MR. BOND: Object to form.

MS. TUCKER: Object to form.

MR. FREEMAN: Object to form.

MS. LONGWELL: Object to form. Calls for an undisclosed expert opinion.

A Yes. 09:35AM

Q What is your opinion?

MR. BOND: Same objection.

MS. HILL: Objection.

MS. TUCKER: Same objection.

MS. LONGWELL: Object to form. 09:35AM

MR. FREEMAN: Object to form.

A Phosphorus is transported from the areas which are treated with poultry litter.

Q Are you, sir, the only one in the scientific community to draw such a conclusion? 09:35AM

MS. LONGWELL: Object to form.

MS. TUCKER: Object to form.

MS. HILL: Object to form.

A No, I am not. Number of studies have been published. 09:36AM

Q And are those very recent studies or are they of some vintage, if you will?

A There were studies in '80s and '90s before I started looking at it, early '90s before I started looking at it. 09:36AM

Q All right. Can you tell the court the names of some authors that you're aware of that have drawn similar conclusions that you've just told us about today?

A Dwayne Edwards or D. R. Edwards has done lots of studies in this area. Dr. Tommy Daniel or T. C. Daniel. Dr. Andrew Sharpley. Dr. Tom Simms, I believe he's a professor somewhere in the Delmarva Peninsula area. He has published. There has been a number of studies. 09:36AM 09:37AM

Q Do you recall generally how those differences -- what they are, what you observed when you tested both?

A It has been a while since I published those.

Q It's not a memory test. If you don't remember, that's fine. 09:41AM

A Yeah.

Q Okay. Have you seen any studies or published materials that concern poultry waste from different bird types would act any different than poultry litter or manure from broilers let's say? 09:41AM

MS. HILL: Object to form.

A Ask the question one more time.

Q Have you seen any studies or published materials concerned with poultry waste from different bird types indicating that it would act different than poultry from broilers, poultry waste? 09:41AM

MS. HILL: Same objection.

A So generally speaking the amount of -- there will always be some losses taking place from the areas treating with -- treated with the poultry waste. The level of magnitude may be different depending upon the consistency and the physical chemical characteristics of the sources. 09:42AM

Q I'm going to hand you Exhibit No. 6, Dr. 09:42AM

Chaubey. This is an article co-authored by you and others entitled Nitrogen and Phosphorus Concentrations and Export From An Ozark Plateau Catchment in the United States published in 2003. This involved the Beaver Lake basin, did it not? 09:42AM

A Yes.

Q And the -- generally what was the purpose of the study, if you can recall?

A The purpose generally speaking was to look at how the -- how much nitrogen and phosphorus was 09:43AM coming from different land use areas in the basin and how do they compare against each other.

Q In the very first sentence it indicates that this was done in 1993 to 1995; is that true?

A Yes. 09:43AM

Q All right, and can you place the location of the Beaver Lake watershed in relation to the Illinois River watershed?

A Both of these are located in northwest Arkansas, so they are in the same physiographic 09:44AM region.

Q Do they in fact abut each other?

A Yeah.

Q This indicates that there are 2,000 poultry houses in the Beaver Lake basin. Were those 09:44AM

documented in this study?

A Clarify that question for me, please.

Q Do you know where the source of that information came from for the 2,000 poultry houses; do you have a recollection? 09:44AM

A I don't remember. Must have come from some published report.

Q Was there land-applied poultry waste occurring in this watershed?

A Yes. 09:44AM

Q About midway down in the abstract portion of this document it says, streams SRP. That's soluble reactive process, is it not?

A Yes.

Q And then NO3-N, is that nitrate? 09:45AM

A Yes.

Q And T and total nitrogen concentrations by geometric mean increased linearly with percent of pasture in watersheds, whereas N and P export coefficient increased exponentially with pastureland use. Can you break that down for lay terms and explain what that means? 09:45AM

A What it means is you got -- you got a watershed and then you got certain percentage of pastures in that watershed. As that percentage of 09:45AM

pastures in the watershed increased, we saw an increase in concentration of these nutrients that we were measuring. So if pasture area went up from 10 percent to 20 percent, we saw an increase in amount of nitrogen and phosphorus that was being transported from these areas. 09:46AM

Q Was there a conclusion or finding based upon what you observed as just described?

A So we looked at the data in this watershed, and the data supported this conclusion. 09:46AM

Q How were the activities of the land use different in the Beaver Lake watershed than what you see in the Illinois River watershed?

MS. TUCKER: Object to form.

MR. BOND: Form. 09:46AM

A The land use distribution is a little bit different. Illinois River watershed has got a lot more pasture areas than Beaver Lake watershed. I believe the amount of percentage of pasture is smaller in Beaver Lake watershed compared to Illinois River watershed, but in terms of the activities on those areas were probably not much difference. 09:47AM

Q All right. At the bottom of this abstract there's a sentence that says, it is apparent that 09:47AM

pasturelands in the basin affect stream nutrient concentrations and export to Beaver Lake and its tributaries. This investigation emphasizes a need to carefully manage poultry litter because small losses of nutrients compared to the total amount of nutrients produced in the basin may still impact stream nutrient concentrations and export. Is that generally what this study found and concluded? 09:47AM

MR. BOND: Object to the form.

A Yes, that was the conclusion from this study. 09:47AM

Q Is that conclusion -- let me ask it this way: Are there other studies of similar nature that shows a relationship with increase in pasture to the amount of nutrients found in the waters of that watershed? 09:48AM

MS. HILL: Object to the form.

A There is at least one water study I'm familiar with in that watershed, but if you look at the general conclusion, there are a number of other studies that point to the same conclusion. 09:48AM

Q Is it fairly well known in the scientific community that increase in pasture uses will also see increase in nutrients in nearby water bodies?

MR. BOND: Object to the form.

MS. TUCKER: Object to form. 09:48AM

MR. FREEMAN: Object to form.

MS. LONGWELL: Form.

A Yes.

Q Are you aware of any studies that conclude otherwise at this time? 09:48AM

A I am not.

Q How would you describe the geological features found in the Beaver Lake basin compared to what you see in the IRW?

MS. LONGWELL: Object to form. 09:49AM

A Both are very similar. Both are underlaid by Karst geology, so their general behavior would be very similar.

Q Look, if you would, at Page 82 of this report in the lower left-hand corner. We can start at the 09:49AM top when you get there, Page 82, upper left, the left-hand column. It says, furthermore, Edwards and Daniel in 1993 reported an increasing relationship between P loading from poultry litter to soils and runoff P levels. That's, I think, a report we 09:50AM talked about earlier, is it not, that you are familiar with?

A Yes.

Q And do you agree with the conclusions that they reached in that report? 09:50AM

MR. BOND: Object to the form.

A Yes.

Q Looking down then in this same column in the very last paragraph, midway down in it it says, increasing nutrient concentrations were observed with increasing proportion of pasture and streams in the Beaver Lake basin, and several investigations have shown similar increasing relationship in basins throughout the United States, and then you cite several studies there, and it goes on to say, thus, land application of poultry manure to pastures in northwest Arkansas may have impacted in-stream nutrient concentrations. Is that a conclusion that you believe is still accurate today? 09:50AM 09:50AM

MR. BOND: Object to the form. 09:51AM

A Yes.

Q Has there been anything occur to your knowledge that would change your opinions as set forth in this report?

A No. 09:51AM

Q On the right-hand column almost directly across from where I was just reading it says, nutrient yields are also about half of that observed in the Illinois River basin during '97 and '99, an Ozark Plateaus catchment near the basin, and then it 09:51AM

cites Green and Haggard in 2001. Did you review that study?

A I have seen Green and Haggard 2001 study.

Q And is that one of the studies you talked about that had drawn similar conclusions as this study? 09:51AM

A Uh-huh.

Q Would that be a yes?

A Yes.

Q Thank you.

A I'm sorry.

Q In your opinion, Dr. Chaubey, is there a correlation between high STP levels and rates of poultry waste manure or poultry litter application?

MS. TUCKER: Object to form. 09:52AM

MR. BOND: Object to form.

Q Let me restate it. Based upon your knowledge, experience and expertise in this area, is high STP levels in soil an indicator of poultry waste application rates in excess of plant requirements? 09:52AM

MS. TUCKER: Same objection.

MR. BOND: Object to form.

MS. HILL: Object to the form.

MS. LONGWELL: Object to form. Calls for an undisclosed expert opinion. 09:52AM

A Yes.
Q What do you base your opinion on?
MS. LONGWELL: Same objection.
A There have been a number of published studies that indicate that if you apply animal manure, including poultry litter, in excess of what is needed by plants, then phosphorus would accumulate over time and that would be indicated as high STP. 09:53AM
Q Dr. Chaubey, can losses of nutrients occur from fields that are low in STP? 09:54AM
MS. TUCKER: Object to form.
MS. LONGWELL: Object to form.
A Yes.
Q And how is that; why does that occur?
MS. LONGWELL: Same objection. 09:55AM
A Runoff when it interacts with the soil, it will pick up nutrients, including phosphorus, from the soil column if any amount of phosphorus is present there. The level of magnitude may be different depending upon the STP. That's why you see some amount of phosphorus coming from entirely forested areas, which may have very, very low STP values. 09:55AM
Q Let's kind of change the subject a little bit. Are you familiar with what's referred to as the 09:56AM

during that meeting?

A I was asked if I would be willing to make a deposition, and my answer was yes.

Q Okay. Why were you willing to give a deposition? 10:46AM

A I believe science should guide the policy in any area, and someone who has worked extensively in the watershed management and non-point source pollution, looking at data collection, looking at modeling, if my knowledge and expertise can guide 10:47AM the policy decisions, I believe in that. So that was what motivated me to say yes.

Q So you have a personal and a professional interest in this?

A I have a professional interest into this. 10:47AM

Q Dr. Engel is one of your peers?

A Yes.

Q At Purdue?

A Yes.

Q Does he have any supervisory capacity or review capacity over you? 10:47AM

A He is the department head in one of the three departments in which I have an appointment right now.

Q During this meeting with Dr. Engel, Mr. Garren 10:48AM

MR. GARREN: Object to form.

A My intention is to offer opinions about how -- these agricultural watersheds we have and specifically the watersheds that may be in the similar physiographic regions with similar hydrologic, geologic soil characteristics. 01:04PM

Q So you do intend to opine that because you see certain things happening in Beaver Lake, that might be also applied in the Illinois River watershed?

MR. GARREN: Object to form. 01:05PM

A Some of the processes will be similar.

Q And what processes are you referring to?

A I am talking about rainfall runoff processes. I am talking about how different land use activities respond to hydrology and water quality. 01:05PM

Q And those processes can vary a tremendous amount across one basin; is that not correct?

MR. GARREN: Object to form.

A It depends upon what your question is, what you are looking at. It can vary spatially and temporally, but if you look at -- it depends upon the scale of your analysis and what scale you are looking at. 01:05PM

Q And what was the scale of the Beaver Lake study? 01:06PM

A I believe we looked at all major tributaries here. So except some of the minor areas here on the top, it included all the major tributaries that are contributing flow to the Beaver Lake.

Q And from there, you make some general conclusions about what is seen across a watershed; is that -- 01:06PM

MR. GARREN: Object to form.

Q -- what this study says?

MR. GARREN: Object to form. 01:07PM

A I did -- I did not get your question completely. Can you clarify that, please?

Q I was interrupted. I'm sorry. And so the conclusions that you reach in this study are general in nature because they refer to processes across a large basin? 01:07PM

MR. GARREN: Object to form.

A That is correct.

Q And this is not a site specific survey -- study, Exhibit 6? 01:07PM

MR. GARREN: Object to form.

A Again, it depends upon how you look at it because lots of these studies are site specific studies. Why scientifically we try to do there is take general conclusions that could be applicable to 01:07PM

other watersheds and similar conditions, so that if this map become what limnologists call inorganic leaf litter degradation in a mirror stream, but try to under the general behavior that you can expect under similar conditions. 01:08PM

Q Right, but observing general behavior across a watershed doesn't tell you whether that behavior is going to actually happen at a particular site at a particular time even within that watershed?

A It tells you what you can expect in terms of 01:08PM the processes.

Q What may happen?

MR. GARREN: Object to form.

Q A general conclusion about behaviors across a watershed will give you -- is an opinion about what 01:08PM a particular -- a particular process that may happen at a specific site?

MR. GARREN: Object to form.

A Based upon what data has been collected, so what you have seen. So it's not all hypothetical, 01:09PM and it's not all out of line under -- you know, unless the conditions change so much that it's not the same study, you can expect that kind of behavior.

Q Assuming -- 01:09PM

A There will be the, you know, outliers. There will be variability in the data, but if you look at the general behavior of these basins, those general behaviors are applicable.

Q You said if the conditions do not change. 01:09PM

What conditions are you referring to?

A So I am -- for example, climate conditions, right. So suddenly the climate becomes completely different. You -- instead of getting 1,100 millimeter of precipitation, you only get 300 01:09PM millimeters or you get 2,000 millimeters. That will be entirely different condition. So then when you get a sudden change in the land use, the land management practices, unless those -- significantly different changes take place, the general 01:10PM conclusions would still be applicable.

Q So a change -- do I understand a change in land management could be one of those factors that might change the conditions underlying the general conclusions? 01:10PM

MR. GARREN: Object to form.

A Yes.

Q And you also see variability in the data as well; is that correct?

MR. GARREN: Object to form. 01:10PM